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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2017/026

LOBSTER (*HOMARUS AMERICANUS*) OFF THE ATLANTIC COAST OF NOVA SCOTIA (LOBSTER FISHING AREAS 27-33): 2017 STOCK STATUS UPDATE

Context

The scientific basis for assessing Lobster Fishing Areas (LFAs) 27-33 was last examined at a framework meeting in February 2011, followed by an assessment in July 2011 (DFO 2011, Tremblay et al. 2011, Tremblay et al. 2012b). These processes identified three stock units: LFA 27, LFAs 28-32, and LFA 33 and tabled key indicators. Upper Stock Reference (USR) and Lower Reference Points (LRP) based on landings are provided in the Integrated Fishery Management Plan (IFMP) for LFAs 27-33. These were modified in 2012 (DFO 2012, Tremblay et al. 2012a), no other reference points are currently available and other stock references will be explored in the next framework. This Science Response updates key biomass and abundance indicators: landings, commercial catch rates and catch rate of sublegal sizes from Fishermen Scientists Research Society (FSRS) recruitment traps to the end of the 2016 fishing season (2015-16 for LFA 33).

This Science Response Report results from the Science Response Process of February 15, 2017, on the Stock Status Update for American Lobster in Lobster Fishing Areas (LFAs) 27-33.

Background

Description of the Fishery

Lobster Fishing Areas 27-33 are on the Atlantic coast of Nova Scotia from northern Cape Breton to Shelburne County on the south shore (Figure 1). Recent commercial landings for stock assessment units 27, 28-32, and 33 were all high relative to the long-term means (Figure 2). For LFA 33, in particular, recent landings are the highest on record, increasing from 7,069 metric tonnes (t) in 2015 to 10,049 t in 2016.

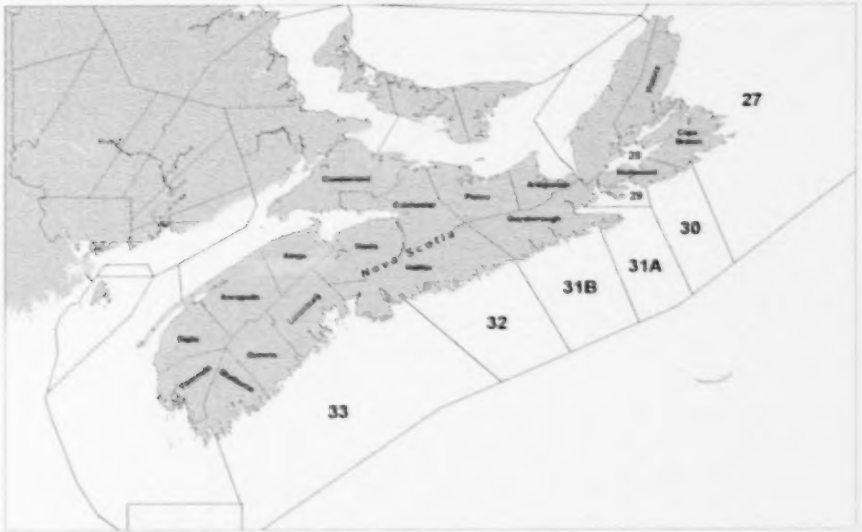

Figure 1. Map of the Lobster Fishing Areas (LFAs) 27-33.

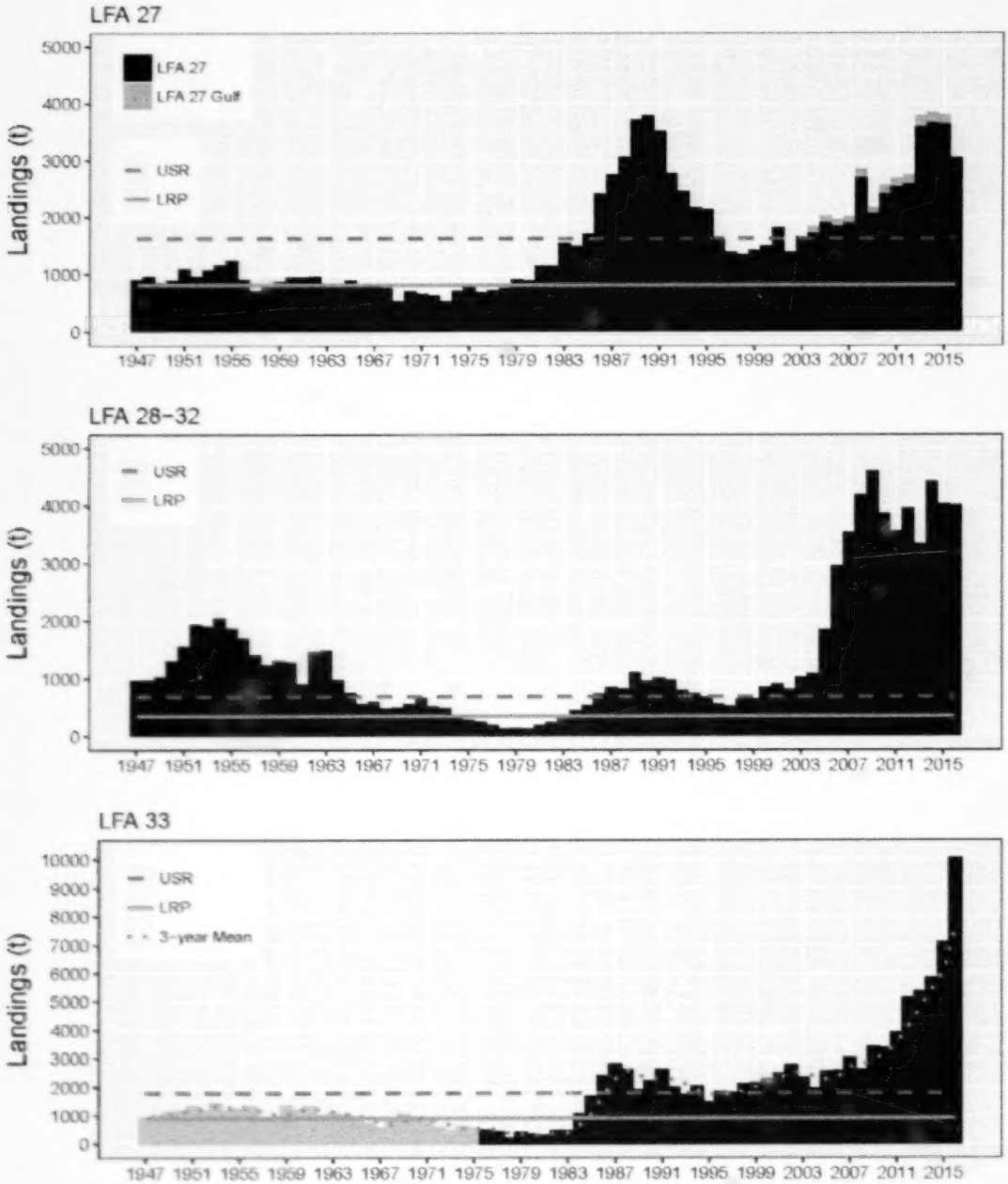

Figure 2. Annual lobster landings by the commercial fishery in LFA 27, LFAs 28-32 combined and LFA 33 from 1947 to 2016 (2015-16 for LFA 33). The Gulf component of landings in LFA 27 were included (grey bars) but were preliminary for 2015 and not available in 2016. Reference points representing the Upper Stock Reference (USR) and Limit Reference Points (LRP) were shown as blue dashed and green solid lines, respectively. In LFA 33, grey landings are based on annual values, while black landings are seasonal values with 2016 representing the season beginning November 2015, and the 3-year running mean is represented by a dotted orange line.

Management measures across all LFAs include closed seasons, limits on the number of licenses, trap limits, minimum legal sizes (MLS), and protection of females with eggs (ovigerous or "berried"; Table 1). Additional LFA specific conservation efforts were outlined in Table 1.

Table 1. Numbers (No.) of licenses and management measures in LFAs 27-33 as of December 31, 2016. (N/A – not applicable)

LFA	Season	Total No. of Licenses	Trap Limit[1]	MLS (mm)	Other Measures
27	May 15th - July 15th	519[2]	275	82.5	N/A
28	April 30th - June 30th	14	250	84.0	Max. hoop size–153 mm
29	April 30th - June 30th	63	250	84.0	Max. hoop size – 153 mm
30	May 19th - July 20th[3]	20	250	82.5	Max. carapace length -135 mm for females
31A	April 29th - June 30th	72	250	82.5	Closed window,114-124 mm
31B	April 19th - June 20th	71	250	82.5	V-notching and release of 110 lb of mature females/ licence
32	April 19th - June 20th	157	250	82.5	V-notching, and release of 110 lb of mature females/ licence
33	Last Mon. November - May 31st	695	250	82.5	N/A

[1] Trap limit is for category "A" licence holder. Part-time or category "B" licences are allowed 30% and Partnerships 150% the limit of a single full-time licence.
[2] Maritimes Region 481 licenses (38 licenses in the Gulf Region).
[3] Regularly varied.

Analysis and Response

Landings-based reference points are included in the IFMP for LFAs 27-38. These were modified using an alternative reference time period (1985-2009 instead of 1985-2004) at a Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). It was recognized that using landings as the sole indicator of biomass for lobster stocks has risks. At the framework and assessment for LFAs 27-33 in 2011, the following additional biomass and abundance indicators were identified - commercial catch rate and catch rate of sublegal sized lobsters in standardized traps. No reference points were adopted for these additional indicators, which will be revisited at the next framework meeting for LFAs 27-33 scheduled for fall 2017.

Landings

The USR for the biomass of legal lobsters based on landings (Table 2) is defined as 80% of the median for the period 1985-2009. The metric for assessing where the stock is relative to the USR is the 3-year running mean of landings. For the season ending in 2016, this metric is above the USRs for all LFAs individually.

Table 2. Lobster landings (metric tonnes) from 1998-2016, 3-year mean (2013-2015), and the Upper Stock Reference (USR) based on the 1985-2009 period as proposed in Tremblay et al. 2012a. Lobster Fishing Area 27G represent the Gulf landings proportion of LFA 27 and are included in the LFA 27 total. Landing values are as of January 29, 2017. ("--" Data not available)

Year	LFA 27	LFA 27G*	LFA 28	LFA 29	LFA 30	LFA 31A	LFA 31B	LFA 32	LFA 28-32	Season	LFA 33
1998	1,347	--	12	52	70	72	128	309	643	97-98	2,103
1999	1,425	--	5	50	70	78	139	316	658	98-99	2,129
2000	1,505	--	5	54	54	87	212	448	860	99-00	2,243
2001	1,820	--	5	66	98	100	204	433	906	00-01	2,460
2002	1,395	--	8	57	79	103	210	358	815	01-02	2,764
2003	1,659	--	13	125	73	152	279	389	1,031	02-03	2,320
2004	1,850	115	8	190	84	213	305	289	1,089	03-04	1,955
2005	2,036	117	9	402	112	426	498	403	1,850	04-05	2,519
2006	1,966	118	11	658	187	672	825	602	2,955	05-06	2,556
2007	2,024	110	9	792	216	827	1,061	632	3,537	06-07	3,033
2008	2,849	138	13	1,076	413	962	1,031	704	4,199	07-08	2,599
2009	2,176	104	14	1,088	452	956	1,270	829	4,609	08-09	3,402
2010	2,570	146	12	914	371	911	1,001	657	3,866	09-10	3,377
2011	2,691	149	7	727	383	757	925	758	3,557	10-11	3,905
2012	2,751	161	11	729	416	807	1,080	922	3,965	11-12	5,126
2013	3,797	209	12	607	461	671	740	862	3,353	12-13	5,345
2014	3,844	174	16	759	455	806	1,148	1,239	4,423	13-14	5,835
2015[1]	3,807	158	16	722	424	754	1,036	1,087	4,039	14-15[1]	7,069
2016[1]	3,041	--	6	680	397	700	1,066	1,164	4,013	15-16[1]	10,049
Mean 2013-2015	**3,816**	**--**	**15**	**696**	**447**	**744**	**974**	**1,063**	**3,938**	**--**	**6,083**
USR	**1,629**	**--**	**120**		**79**	**250**		**242**	**688**	**--**	**1,838**

*NOTE: LFA27G refers to Gulf landings, the 2015 value is preliminary, and the 2016 value is not available.

[1] Preliminary landings values.

Commercial Catch Rate

The Catch-Per-Unit-Effort (CPUE) of commercial sizes (CPUE, in kg trap haul^{-1}) for 2004-2016 from mandatory logs and voluntary logs are shown in Figure 3. In each of the past four years, CPUE in LFA 27 north and south, were higher than those recorded for 2008-2012 and also the highest values from the voluntary logs. In LFA 27 north, catch rates were declining over the past three years but appear to have stabilized in 2016. For LFA 28-32, CPUE in 2016 was similar to 2015; however, in LFAs 31B and 32, the current CPUE remained above the long term means (2008-2015). Current CPUEs for LFAs 28, 29, 30, and 31A were below their long term mean and down from the peak of 2009, but remain higher than pre-2005 voluntary-log CPUEs. CPUE in LFA 33 continues to be higher in the west than in the east and both areas have increased continuously since 2008. In both areas of LFA 33, commercial CPUE in recent years is higher than the values recorded in voluntary log records going back to the mid-1980s.

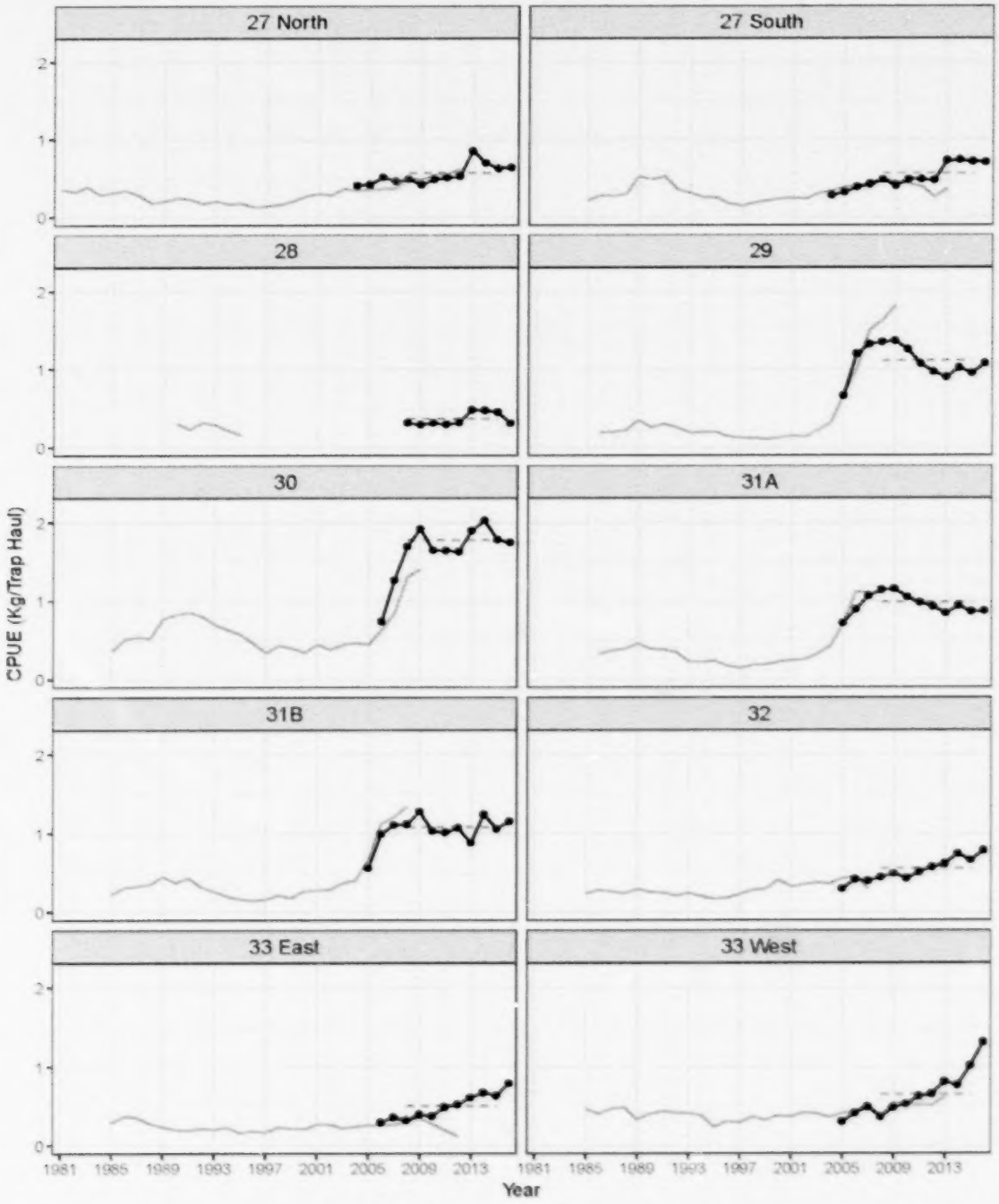

Figure 3. Trend in commercial CPUE (CPUE; kg trap haul^{-1}) for LFAs 27, 28-32, and LFA 33 using mandatory log book data (black lines with dots), voluntary logs (red lines), and the mean for years 2008 to 2015 inclusive (horizontal blue dashed lines). The CPUE is calculated as total weight landed/total trap hauls.

Catch Rate of Sublegals in Standardized Traps

The CPUE for sublegal sized lobster (number trap haul^{-1}) for 1999-2016 from FSRS standardized traps are shown in Figure 4. For LFA 27 north and south there has been a substantial increase in the CPUE of sublegals in the last 3 – 4 years; although LFA 27 north decreased in 2016 relative to 2015. The increase over the last several years in LFA 27 was related to increases in MLS as size classes of lobsters that were previously classified as legal are now deemed sublegal but are still retained by FSRS traps.

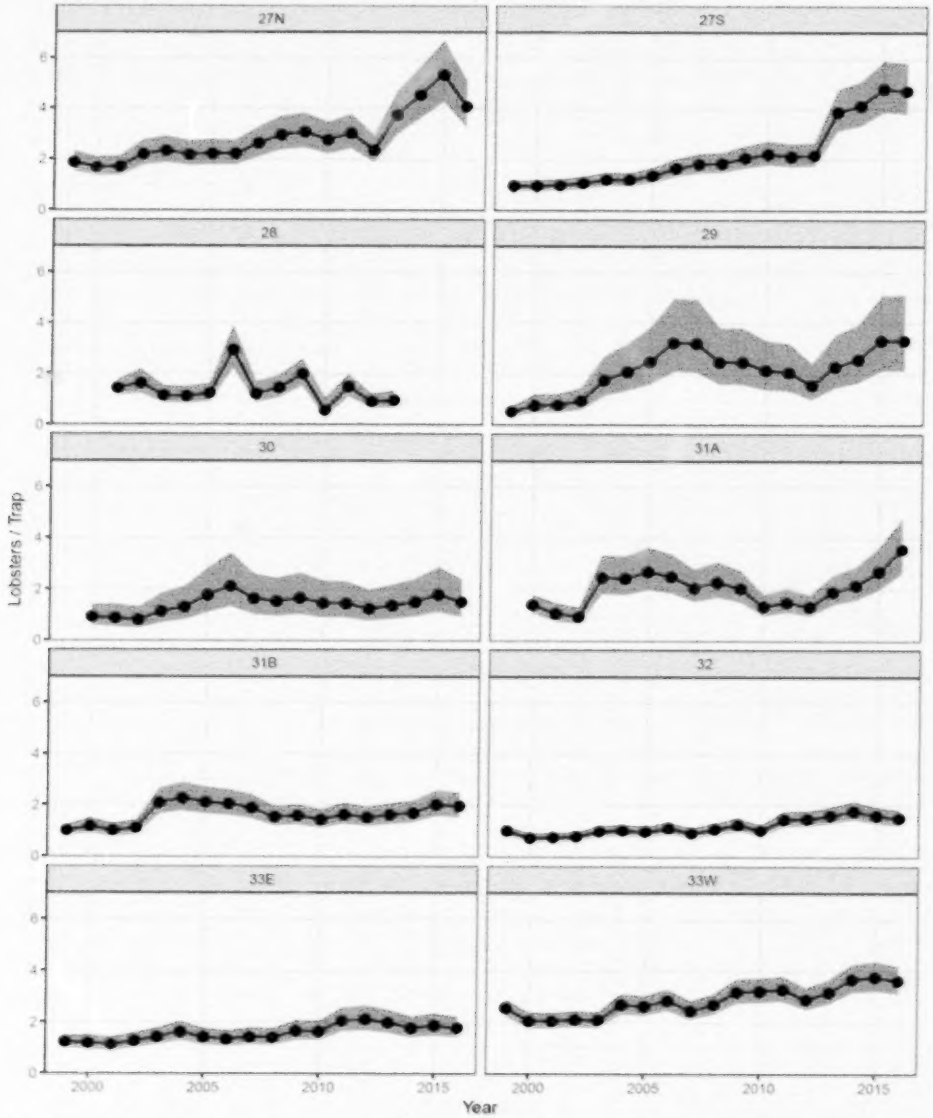

Figure 4. Trend in the catch rate of sublegal lobsters from recruitment traps (total number /total trap hauls) for LFAs 27, 28-32, and 33. Trends are from area specific generalized linear mixed models of CPUE incorporating year, temperature, and abundance of legal sized lobsters as fixed effects and vessel as a random effect. The 95% confidence intervals are shown as shaded polygons.

For LFAs 29 and 31A, sublegal catch rates have been increasing over the last 3 to 4 years. Catch rates in LFA 30, 31B, 32, and 33E have been fairly stable over the past several years at levels above those recorded between 1999-2004. In LFA 33W, sublegal CPUE has gradually increased since the early 2000s and have stabilized at a high level in the last three years.

Conclusions

The lobster stocks in LFAs 27, 28-32, and 33 at the end of the 2016 fishing season were considered to be well within the Healthy Zone. The 3-year running means of landings for all individual LFAs were above the proposed USRs. Catch rates of legal and sublegal lobsters remain high relative to historic levels, providing support to the assertion that these stocks are in the Healthy Zone.

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Sources of Information

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